QUALITY ASSURANCE PROJECT PLAN FOR
RAINIER COMMONS HOUSE DUST SAMPLE COLLECTION
AND ASSESSMENT

Prepared by:

USEPA Region 10
Office of Environmental Assessment
1200 6th Avenue Suite 900, Seattle, WA 98101
November, 2014

Approval:

_____ **Date:** _____
Michelle Mullin, Project Manager, USEPA

_____ **Date:** _____
Ginna Grepo-Grove, Region 10 QA Manager

Project Management Elements

1.1 Distribution List

Table 31: Distribution List

Copies of the approved/signed Site Specific QA project Plans shall be distributed to the following:				
Name	Title/Role	Phone Number	Mail Stop	E-Mail
Michelle Mullin	Remedial Project Manager	(206) 553-1616	OCE-084	Mullin.michelle@epa.gov
Jeffry Rodin		(206) 553-6709	ECL-116	Rodin.Jeffry@epa.gov
Michael Worden	START Project Manager, Contact with analytical laboratories	(206) 419-3419 (cell);		MWorden@ene.com
Lon Kissinger	HH Risk Assessor	(206) 553-2115	OEA-095	Kissinger.Lon@epa.gov
Jennifer Crawford	QA Officer	(206) 553-6261	OEA-095	crawford.jennifer@epa.gov
Gina Grepo-Grove	QA Manager	(206) 553-1632	OEA-096	Grepo-Grove.Gina@epa.gov

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1.2 Project Management/Task Organization

Michelle Mullin, EPA Project Manager (PM), has the overall responsibility for management of the project. PM will coordinate sample collection, providing planning background information in addition to coordinating the final assessment of the data. The PM will also be working with the property owners and operators.

Jennifer Crawford will be the Regional QA Manager's delegated QA Officer for this project. She is responsible for assisting in the writing and approval of the QA Project Plan and providing consultation on the final evaluation of the validated data.

Gina Grepo Grove, Regional QA Manager, will coordinate with Jennifer Crawford in QA and data validation.

Jeff Rodin, On Scene Coordinator, will oversee START project work and sampling.

Michael Worden, START Project Manager, will conduct sampling and conduct START project work.

1.3 Problem Definition/ Background

Rainier Commons is under an approval to remove PCB contaminated paint from exterior surfaces of the buildings. The approval requires that Rainier implement control measures such as conducting work under negative containment and preventing the release of blast media and paint into tenant spaces through the use of poly sheeting over tenant window, both inside the tenant space and on the exterior side of the window. Additionally, Rainier is required to conduct particulate monitoring inside spaces where active blasting is occurring and outside, down-wind of the containment structure. These controls are the same as those recommended in EPA guidance to contractors handling PCB bulk product, and many of these controls are similarly employed at asbestos remediation sites. Blasting activities concluded August 19, 2014. On September 24, 2014, Michelle Mullin received a call from an attorney for one of the tenants, expressing concern that dust had entered the tenant space as a result of a breach of containment. On October 2, 2014 a second tenant contacted Mrs. Mullin regarding concerns that dust may have entered their space as a result of blasting activities. On October 5th, 2014 a

third tenant contacted Mrs. Mullin expressing concerns that dust related to blasting activities may have entered tenant space. Mrs. Mullin then visited the site, and met with two tenants on October 6, 2014. During this visit, no visible dust was observed in the windowsills or floor under the windows. It was confirmed that Rainier cleaned the window areas. Data that Rainier has collected, in the form of Total Solid Particulate monitoring, analytical air sampling, and bulk dust, has not indicated any adverse risk to human health or the environment has occurred, nor did they identify any visual evidence of a breach during any of their inspections of the tenant spaces. However, one tenant hired a consultant who collected samples and photographs which oppose Rainier's conclusions. To this end, it must be determined if the cleaning activities that Rainier employed in the tenant spaces were effective in mitigating risk to potential PCB exposure from blasting activities.

This QAPP is therefore developed to address the sampling and analysis needs of the dust sampling and the appropriate QC activities that will be included during sampling and analysis.

1.4 Objectives/Scope

The objective of this project is to characterize PCB concentrations in dust and on surfaces within commercial and residential spaces within RC, and correlate these concentrations with blasting activites. The data collected is anticipated to be of sufficient quantity and quality to assess human health risks and adherence to the PCB regulations and December 18, 2013 Risk Based Disposal Approval and all corresponding Amendments.

1.5 Project Description

1.5.1 Project/Task Description

PCB levels within RC will be characterized by collecting and analyzing dust and surface residue samples. Correlation to blasting activities will be conducted through co-locating wipe samples for blasting media metals. Three types of samples will be collected:

1. Dust samples collected with Nilfisk vacuums,
2. Hexane wipe samples from surfaces that have not been vacuumed,
3. Ghost wipe samples from surfaces that have not been vacuumed.

Samples will be used to characterize PCB and metal concentrations in dust.

1.5.2 Schedule of Tasks and Activities

Table 42: Activity Schedule and Tentative Start and Completion Dates

Activity	Start-End Dates	Comments
Preparation, review and approval of QAPP	End: 11/7/2014	
Laboratory Coordination		
Mobilization to Site	11/12	
Sample Collection	11/12	
Lab Analysis	8 weeks	Estimated

Data Review	2 weeks	Estimated
Data Reconciliation	1 week	
Data Reporting		

1.6 Quality Objectives and Criteria for Measurement Data

The data will primarily be used to make the determination if an adverse risk to PCBs from blasting activities exists. Data Quality Objectives are summarized in Table 5 of this QAPP.

Data Quality Objectives (DQOs) are the quantitative and qualitative terms project managers use to describe how good the data needs to be in order to meet the project's objectives. DQOs for measurement data (referred to here as data quality indicators) are precision, accuracy, representativeness, completeness, comparability, and measurement range. The overall QA objective for analytical data is to ensure that data of known and acceptable quality are provided. To achieve this goal, data must be reviewed for 1) representativeness, 2) comparability, 3) precision, 4) accuracy (or bias), and 5) completeness. Precision, accuracy, completeness, sample representativeness and data comparability are necessary attributes to ensure that analytical data are reliable, scientifically sound, and legally defensible. Each analytical result or set of results generated should be fully defensible in any legal action, whether administrative, civil or criminal.

Precision: The precision of the analyses are measured by monitoring the relative percent differences between duplicate measurements. Laboratory precision and accuracy can be measured by the laboratory measuring Matrix Spike/Matrix Spike Duplicate (MS/MSD) samples and the analysis of laboratory duplicate samples. Laboratory MS/MSD analyses are usually performed on a 5% frequency (1 per 20 samples) while field duplicate samples analyses are performed at a 10% frequency (1 per 10 samples collected). Field and analytical precision are evaluated by the calculating the relative percent difference (RPD) between field duplicate samples, laboratory duplicate samples. Relative Percent Differences are calculated using the following formula:

$$RPD = \frac{ABS(R1 - R2)}{[(R1 + R2)/2]} \times 100$$

R1 = Recovery for MS or duplicate 1
R2 = Recovery for MSD or duplicate 2

Accuracy: Accuracy will be evaluated by the using percent recovery (%R) of the target analyte in spiked samples (MS/MSD) and also the recoveries of the surrogates in all samples and QC samples. Percent recoveries are calculated as follows:

$$\% \text{ Recovery} = \frac{SQ - NQ}{S} \times 100$$

SQ = quantity of spike or surrogate found in sample
NQ = quantity found in native (un-spiked) sample
S = quantity of spike or surrogate added to native sample

Representativeness is the degree to which data from the project accurately represent a particular characteristic of the environmental matrix which is being tested. Representativeness of samples is ensured

by adherence to standard field sampling protocols and standard laboratory protocols. The design of the sampling scheme and number of samples should provide a representativeness of each matrix or product of the chemical processes being sampled.

Comparability is the measurement of the confidence in comparing the results of one sampling event with the results of another achieved by using the same matrix, sample location, sampling techniques and analytical methodologies.

Completeness: Completeness is the percentage of valid results obtained compared to the total number of samples taken for a parameter. Since sampling are grabs and limited in number, the number of valid results obtained from the analyses are expected to be 100%. % Completeness may be calculated using the following formula:

$$\% \text{ Completeness} = \frac{\text{\# of valid results}}{\text{\# of samples taken}} \times 100$$

The QA objectives outlined, above, will be evaluated in conjunction with the data validation process.

1.7 Special Training Requirements/Certification

Samplers need to have a proper training in the collection of dust samples using the Nilfisk vacuums and in the collection of wipe samples. A procedure describing the vacuum and wipe collection processes is provided in Section 2.2. General safety precautions will be followed.

The analysts performing the analytical work for this project have extensive knowledge and skill in the execution of the analytical methods being requested.

1.8 Documentation and Records

Documentation for field samples needs to include the date and location where specific samples were collected. This may be maintained in field collection notes and/or transcribed onto chain of custody forms. Photographs of sample locations may also be used to clarify the types of surfaces where dust samples were obtained. Documentation records need to be complete such that the analytical results can be traced to a dust sample obtained from a known location on a specific date. Any field notes deemed necessary to complete this documentation needs to be maintained with the site file.

The following documents will be archived at the laboratory performing the analyses: (1) signed hard copies of sampling and chain-of-custody records (2) electronic and hard copy of analytical data including extraction and sample preparation bench sheets, raw data and reduced analytical data.

The laboratory will store all sample receipt, sample login, extraction/preparation, and laboratory instrument print-outs and other analytical documentation as per their established procedures.

2 Measurement/Data Acquisition

2.1 Sampling Process Design (Experimental Design)

Tenant concerns were reported to EPA for units 10-400, 10-300, 10-200 and 11-200. EPA reached out to two other tenants in building 10/11 and received one response requesting no follow-up sampling. Samples will be collected in the 4 units listed above. PCB wipe samples will be co-located with Ghost samples for metals analysis. Bulk dust will also be collected with a Nilfisk vacuum at the same general location as wipes. Samples will be collected at the windowsills and floor underlying the windows, as well as at a mid-way point in the room, and then at the back of the room. The purpose is to determine if cleaning at the windowsill/floor after blasting activities ceased was sufficient to protect human health from blasting activity related PCBs.

2.2 Sample Collection Methods

Refer to Appendix A of this QAPP for the Standard Operating Procedure (SOPs) for the collection, sieving and processing of vacuum dust and wipe samples.

2.3 Description of samples to be taken

2.3.1 Sample coding

Sample coding will be provided as an addendum to this QAPP.

2.3.2 Description of locations where samples are to be taken

Figures 1 is a diagram of the Rainier Commons Complex with a circle around the buildings where samples are to be taken. EPA will collect samples at only one location unit listed in Table 3. A separate attachment includes the floor plans and approximate locations of each sample collection point.

Table 53: Description of sample locations

Building	Location	Carpeted = "C" Non-carpeted = "NC"	Description of location`
10	10-400	NC	Fourth floor 1-bedroom apartment.
10	10-300	NC	Third floor studio loft
10	10-200	NC	Second floor office space
11	11-200	NC	Second floor office space

2.3.3 Description of types of samples to be taken at each location

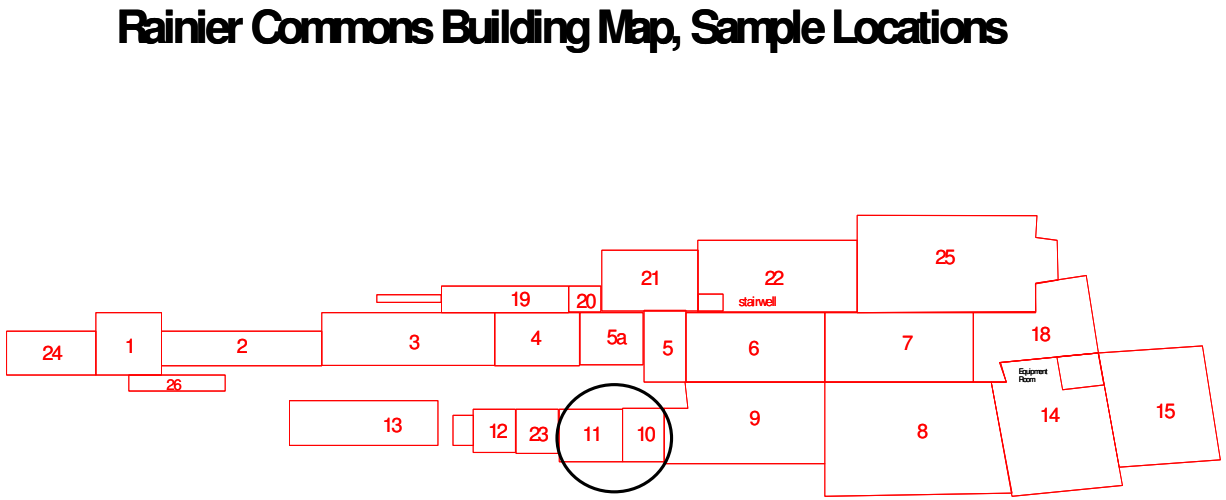
At each location, three samples will be taken:

1. A dust sample collected by Nilfisk vacuum.
2. A hexane wipe sample adjacent to the vacuum sample, which was not vacuumed for a PCB dust sample
3. A ghost wipe sample co-located with the vacuum and hexane samples, from an area that was not vacuumed or wiped, for a metals dust sample.

Hard surfaces are to be preferentially sampled. In each unit all three sample types will be co-located. Samples will be collected 1) on each windowsill, 2) on the floor underneath the windowsill, 3) at a point mid-way between the wall with the windows and the back of the room 4) at the back of the room. Surfaces other than the floor are preferred for the mid-point

and back of room samples, to control for PCBs present from blasting media vs. track-in from outside.

Figure 1:


Rainier Commons Building Map, Sample Locations
24
1
26
2
3
4
5a
5
19
20
21
22
stairwell
25
6
7
18
Equipment Room
13
12
23
11
10
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14
15

2.4 Sample Handling and Custody Requirements
Sample custody and documentation will be consistent with established EPA Region 10 protocols. Sample will be placed inside a certified clean sample container and labeled with information including a sample identification number and covered with a custody seal. Information about each sample will be entered on a chain of custody form that will accompany the samples to the laboratory. Samples will be shipped via Federal Express to EPA's Manchester Environmental Laboratory.

2.5 Analytical Methods Requirements
The analytical methods that will be used for this project are specified in Table 2 of this QAPP.

2.6 Quality Control Requirements
Routine Quality Control measures associated with the methods specified in Table 2 will be followed for each analysis.

2.7 Instrument/ Equipment Testing, Inspection, and Maintenance Requirements
All instrument/equipment testing, inspection and maintenance will follow the standard operating procedures for any preventative maintenance required on laboratory instruments specified in the laboratory's QA Manual.

2.8 Instrument Calibration and Frequency
Laboratory instrument calibration will consist of a multi-point calibration in accordance with the method requirements and will be comprised of Aroclors 1016 and 1260. Instrument calibration will be followed by an analysis of single point comparison standards for the remaining Aroclors of concern (minimally 1242, 1248 and 1254). For any Aroclor type detected in the sample, a continuing calibration verification standard of the same Aroclor type will be analyzed within 72 hours of detection in the sample. PCB detections greater than 1 mg/Kg will be further confirmed using GC/MS analysis SW846 Method 8270C and raw and background subtracted sample spectra meeting US spectral matching criteria will be submitted with the data package.

2.9 Inspection/ Acceptance Requirements for Supplies and Consumables
All sample containers and filters that will be used for this project shall be a "Q-Quality" category and "certified clean" by the laboratory by providing a GC run per lot of containers used. All filter samples used for this project will be contained in sealed glass jars.

2.10 Data Acquisition Requirements (Non-Direct Measurements)
There will be no non-direct measurements for this project.

2.11 Data Management
A field log notebook, photos and the Field Sample and Chain of Custody Data Sheets will be used to document the sampling and inspection activities. For each sample location, the following will be recorded in the notebook: site name and address, sample number, date, time of each sample collection, physical description of each sample collection point, weather conditions, color, sample appearance, sample identifier, and measurements. The Field Sample and Chain of Custody Data Sheets will have the following information: site name, sample number, date, time of each sample collection, sampler's name or

initials and sampling location. If applicable, a suffix l -FD will be appended to the sample identified as the field duplicate. For fixed laboratory analyses, field duplicates will be assigned a separate unique sample identifier and will be submitted 'blind' to the analytical laboratory. Analytical duplicate results will be reported with a trailing -AD (analytical duplicate) or D.

Field records shall be managed and kept on file by OEA/RSCC. Laboratory records including instrument outputs including final analytical reports shall be archived electronically at the laboratory indefinitely.

Data deliverables equivalent to the CLP- staged electronic data deliverables 2 B (SEDD2B) shall be submitted by the laboratory to the PM.

3 Assessment/Oversight

3.1 Assessments and Response Actions

The PM will be responsible for reviewing field log notebooks for accuracy and completeness within 48 hours of the sampling event. Sample results provided to the PM by the laboratory will be appended to the project reports. The PM will compare the sample information in the field log notebooks with the analytical results appended to the inspection report to ensure that no transcriptions errors have occurred.

Test America is NELAC accredited laboratory and participates in the EPA's round robin studies and performance evaluation (PE) studies. For oversight purposes, field and data assessments maybe conducted by EPA Quality Staff upon request by the project PM.

Unavoidable deviations from the procedure set forth in the QAPP shall be documented in the Sample Alteration Plan (Attachment 1) and approved by the Project PM and the QA Officer prior to implementation. Corrective action procedures that might be implemented from QA results or detection of unacceptable data will be developed if required and documented in Attachment 2.

3.2 Reports to Management

The PM will be responsible for checking field sampling information for accuracy and completeness. Reviewed sample results may be appended to any subsequent analysis or site reports. Laboratory excursion report and corrective action notices shall be issued by the laboratory to document laboratory issues and resolutions when needed.

4 Data Validation and Usability

4.1 Data Review, Validation, and Verification Requirements

The criteria for the review and/or validation will follow those specified in this QA plan and the criteria specified in the methods.

4.2 Validation and Verification Methods

All data generated shall be reviewed in accordance with the QA/QC requirements specified in the methods, the technical specifications outlined in the QAPP and as applicable, the most recent Functional Guidelines for Inorganic and/or Organic Data Review and the "*Guidance for Labeling Externally Validated Analytical Data for Superfund Use, OSWER 9200-.1-85, EPA-540-R08-005, January 2009".*

The summary of all analytical results will be reported to the RCO. The raw data for this project shall be maintained by the laboratory. Data review will be performed by the laboratory for all the analyses prior to the release of data. The laboratory will also archive the analytical data into their laboratory data management system.

All data generated at contract laboratories will be reviewed and verified by the USEPA chemists not involved with the sample analyses. In cases where an independent third party validation of the data is needed, one of the USEPA QA chemists in Seattle Office will validate the data as coordinated by the RPM.

4.3 Reconciliation with User Requirements

All data and related information obtained during the course of this project will be included in a data report package to be submitted to the Project Manager. Results of the validated analytical data will reviewed against the project's data quality objectives for accuracy (adequate reporting limits) and completeness.

4.4 Data Qualifiers and Data Validation Report

Based on the results of the DQO assessments performed, bias and usability of the reported results will be evaluated and discussed in a Data Validation memo. Analytical results will be qualified using the following qualifiers as a result of the data validation:

Table 64: Data qualifiers

U	The analyte was not detected at or above the reported result.
J	The analyte was positively identified. The associated numerical result is an estimate.
UJ	The analyte was not detected at or above the reported estimated result. The associated numerical value is an estimate of the quantitation limit of the analyte in this sample.
R	The data are unusable for all purposes.
N	There is evidence the analyte is present in this sample.
JN	There is evidence that the analyte is present. The associated numerical result is an estimate.

Table 5: Summary of Data Quality Objectives

Total Samples[1]	Location	Parameter	# QA Samples	Matrix	Container	Holding Time	Preservation	Grab/ Composite	Method	Reporting Limit[2]	Precision	Accuracy	Complete-ness
	House or building dust samples	PCBs	1 filter blank	Dust	Filter / Glass Jar	14 days extraction / 40 days analysis	none	Grab	8082	0.1 mg/kg	50% RPD	50-150%	100%
	Wipe samples	PCBs	1 wipe blank	Surface residue	Wipe / Glass Jar	14 days extraction / 40 days analysis	none	Grab	8082	0.5 µg/wipe (dependent on lab capability)	50% RPD (field duplicates)	50-150%	100%

1 Includes field samples only. QA samples will include field blanks and field duplicates.
Method equivalence to USEPA Contract Laboratory Program as administered under the Manchester laboratory's standard operating procedures.
2 The bases for the specified reporting limits are included in Appendix B.

Attachment 1

Sample Alteration Form

Project Name and Number:_____

Material to be Sampled:_____

_____

Measurement Parameter::_____

_____

Standard Procedure for Field Collection & Laboratory Analysis (cite reference):

_____

_____

_____

_____

_____

Reason for Change in Field Procedure or Analysis Variation:

_____

_____

_____

_____

_____

Variation from Field or Analytical Procedure:

_____

_____

_____

_____

_____

Special Equipment, Materials or Personnel Required:

_____

_____

_____

_____

_____

Initiators Name:_____ Date:_____

Project Manager: _____ Date:_____

QA Officer:_____ Date:_____

Attachment 2

Corrective Action Form

Project Name and Number:_____

Sample Dates Involved:_____

Measurement Parameter:_____

_____

Acceptable Data Range:_____

_____

Problem Areas Requiring Corrective Action:

_____

_____

_____

_____

_____

Measures Required to Correct Problem:

_____

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Means of Detecting Problems and Verifying Correction:

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_____

Initiators Name:_____ Date:_____

Project Manager: _____ Date:_____

Appendix A: Dust Sampling and Processing Procedures

1 Vacuum Dust Collection

1.1 Materials for Vacuum Dust

1. Isopropyl alcohol
2. Waste container with cap for isopropyl alcohol
3. Disposable gloves
4. KimwipeTM
5. Measuring tape and masking tape
6. Housedust Sample Data Sheets
7. Sharpie and sample labels
8. Field notebook
9. Nilfisk UZ 940
10. Nilfisk UZ 940, vacuum cleaner accessories (vacuum cleaner bags, polyliner bags, straight steel wand, 32-mm anti-static vacuum hose, 32-mm anti-static vacuum hose coupler components, and 5" upholstery nozzle)
11. Extension cord
12. Adapter (3-prong to 2-prong)
13. Vacuum template (0.5 m x 0.5 m template) (Some may be constructed on site)
14. Ziplock plastic bags (9" x 13")
15. Regular pen
16. Storage boxes (for transporting supplies)
17. Paper towels
18. Clamp for gauze to decontaminate wand

1.2 Pre-field Preparation

Clean the Nilfisk vacuum hoses, curved plastic tubes, and upholstery nozzles with soap and water, tap water rinse and solvent rinse with ethyl alcohol.

1.3 Collecting Dust Samples:

1. Insert a pre-weighed sample collection sock over the end of the metal tube at the tip of the vacuum hose, folding back a circle of material so that it surround the metal tube.
2. Fit an upholstery nozzle over the metal tube at the tip of the vacuum hose, thereby securing the sample collection sock in place.
3. Where possible, apply a 0.5 m by 0.5 m template to delineate the sampling area and tape it down with masking tape. If the available area will not accommodate the use of the template, mark out a rectangular area using masking tape and record the length and width to allow calculation of area. Using the Nilfisk vacuum cleaner unit hooked up to the upholstery nozzle, vacuum the marked out area in a repetitive fashion (up, down, over; repeat (see diagram below)). Once the entire area has been vacuumed, vacuum the same area again in the same manner, but in a perpendicular direction to what was originally done (see diagram below). Completion of this procedure will ensure that each area within the vacuuming template will have been vacuumed over four times.

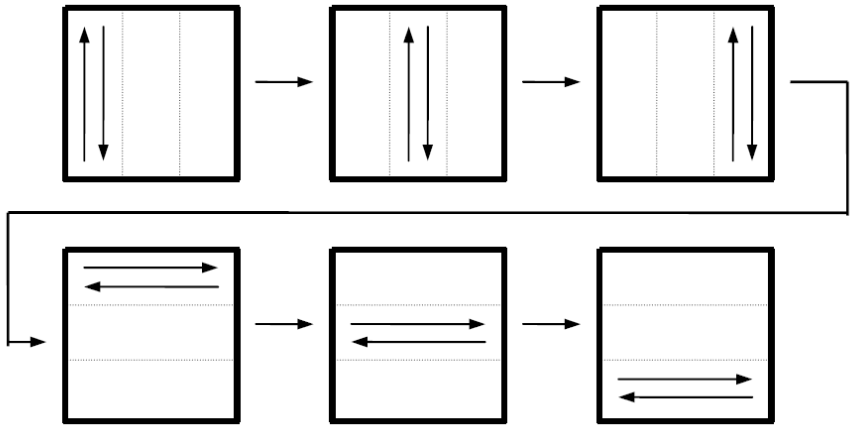

Figure 2: Procedure for vacuum collection of dust samples

4. The dust collection procedure calls for a total dust sample of approximately 3 grams, although more is better.

5. Weigh the bags and accumulated dust. Obtain the weight of dust by subtracting the weight of the bags from the weight of the bags and accumulated dust.

6. If the dust weight is less than 3 grams, sample another 0.5 m x 0.5 m are next to the area just sampled, repeating steps 1-5. If an additional 0.5 m x 0.5 m area is not available, measure the additional area to be vacuumed and record the subarea sampled so that total area can be computed.

   Use the following floor, room, and area preference lists/protocols to help make decisions during the vacuuming procedure:

   A. Surface Preference
      1. Window sills
      2. Smooth floors at windows
      3. Shelves at mid-point and back of room
      4. Smooth floors at mid-point and back of room if necessary

   B. Room Preference
      1. Living/common room
      2. Kitchen/dining area
      3. Bedroom
      4. Use your judgment and be sure to record your choice

   C. Area Protocol
      1. Four (4) template areas for shaggy, ≥ 1 inch fiber carpet
      2. Six (6) template areas for low < 1 inch carpet
      3. Eight (8) template areas for smooth floors

7. Record this information on the sample datasheet. Record on the Housedust Sample Data Sheet the location and size of the sample area. Transfer the sample sock to a clean glass jar.

8. Place the house dust sample into a storage box or cooler (36 qt) for transfer to the Field Base. No ice is necessary.

9. After removing the sample sock, with a slightly moistened paper towel (use deionized water from the squeeze bottle), wipe clean the metal vacuum

2 Wipe Sample Collection for Characterization of Dust and Residue Concentrations

2.1 Materials

1. Bag, plastic, sealable with "zip" type seal.
2. Glass sample container
3. Gauze: 4" x 4" cotton gauze
4. Gloves: Natural Latex Rubber, Nitrile, or Neoprene
5. Solvent: Hexane
6. Template Plastic sheet or cardboard: 100 cm^2

2.2 Surface Wipe Technique

1. Moisten the wipe pad with 1 to 2 ml of hexane. Apply only enough solvent to moisten approximately 80% of the area of the wipe pad. Avoid excess solvent on the filter or pad as it may cause drips and running on the surface thus diluting the sample.

2. Place the template over the area to be sampled or measure out a 100-cm2 surface area.

3. (SEE Figure 2) Wipe the surface with firm pressure, using 3 or more S-strokes (in one direction, covering the entire surface). Fold the exposed side of the pad or filter inward (i.e. fold in half). If the surface is very rough, a dabbing action may be substituted for the S-stroke wipe. Indicate dabbing done on

4. Using the once-folded media, wipe the same area with S-strokes at right angles to the first wipe. Fold the exposed side of the pad or filter in.

5. Using the twice-folded media, wipe with S-strokes in the original direction. Fold the exposed side of the pad or filter in.

6. Place the media in a plastic bag or vial. Seal the zip lock or vial. Record the sample identification on the bag or vial.

7. Discard paper templates in preparation of the next sample. Based on testing of templates of similar material, templates can be disposed as normal trash.

8. Remove gloves and discard appropriately before handling the next filter or pad.

9. Record the sample identification, surface area sampled, and description of the sample and surface,

10. Include 1 blank filter or pad (moisten and placed in bags or vials) with each set of samples (provide 1 blank per 6 samples).

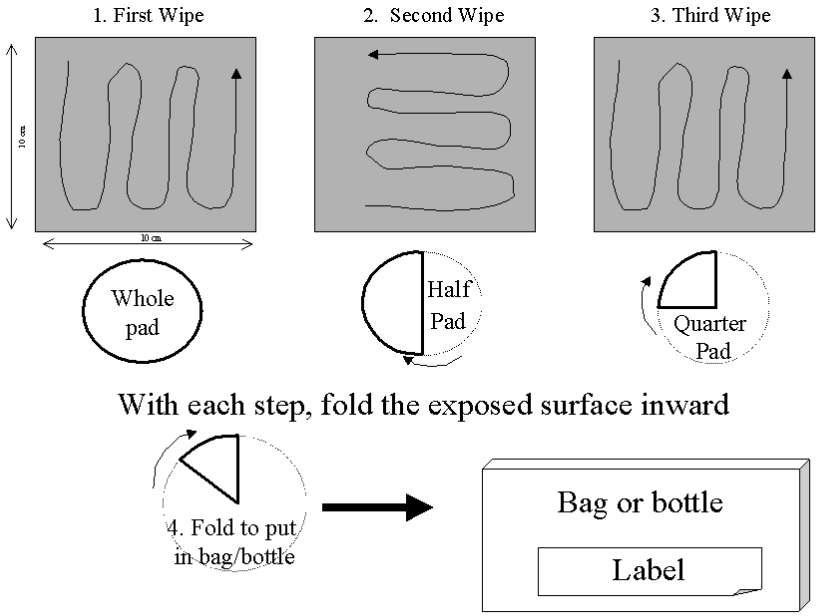

Figure 3: Wipe Sample Collection Procedure

3 Procedure for Sieving Nilfisk Vacuum Dust Samples

3.1.1 Dust Sieving Processing Materials

EKCO oven pan (9”x13”)
Mechanical sieve shaker (CE Tyler Combustion Engineering, Inc. Model RX-24)
Shaker sieve set (cover, screen pan, and receiving pan; W.S. Tyler ISA Standard Testing Sieve (No. 100, 150 µm, and ¼-inch ASTM E-11 specification)) (multiple sets, depending on the number of samples to be processed)
Analytical balance (Mettler Toledo No. AG104)
Disposable gloves (latex or nitrile)
Disposable dust mask
Camel’s hair/fine-hair paint brushes (1” or 1.5” wide)
Plastic weighing boats
Polypropylene bottles (30 ml, wide mouth)
Glass sample jars (ICHEM, 250 ml, wide mouth)

Acetone
Kimwipes
Scissors

3.1.2 Dust Sample Processing

1. Select a clean working area where recovery of the samples is to be performed (a 4-foot by 4-foot area will be sufficient).

2. Wearing latex gloves to handle the bag and a dust mask for protection, retrieve the vacuum collection bag from the ziplock bag used to transport the dust sample from the field laboratory.

3. Place the No. 100 sieve screen pan atop of the receiving pan. Empty the contents of the vacuum bag into the No. 100 sieve screen pan through the bag opening. Complete this step by removing the plastic adaptor from the vacuum collection bag inlet. This may be done by cutting the adaptor from the vacuum bag. Slowly work the bag open by shaking the bag as necessary to ensure all the contents have been transferred into the sieve screen pan. Because some dust may be lodged in the sides and creases of the vacuum bag and may be difficult to pour out of the top opening, it is a good idea to try to remove dust from the bottom of the bag. This can be done by cutting the bag along the bottom edge and carefully jostling the bag to assist the dust into the sieve screen pan.

4. Make sure that the mechanical sieve shaker is placed on an even and stable surface (it's best to place the shaker on the floor). Put the cover on the sieve screen pan and place both pans (sieve screen pan atop the receiving pan) into the mechanical sieve shaker. Use the sieve shaker clamps to secure the pans.

5. Turn the shaker on for approximately 5-10 minutes until all the fine dust particles are collected in the bottom receiver pan. Do not leave the sieve shaker alone while it is on! The mechanical shaker's manual should be consulted if any questions arise.

6. Additional resieving may be necessary should large particles make their way through the sieve screens. Should this be the case, remove the large particles caught in the sieve screen pan (set aside if total weight is desired) and put a second receiving pan into place **before** transferring the dust collected in the first receiving pan back into the sieve screen pan. A brush is helpful to make sure all dust particles are transferred.

7. Using a pre-weighed plastic weighing boat and the analytical balance, weigh the sieved (< 150 μm fraction) dust sample. If the total weight of material collected is desired, the coarse material (> 150 μm fraction) remaining on top of the sieve must be gathered and weighed. The total weight of all material collected is the weight of the coarse material plus the weight of the sieved dust. All weights should be recorded to at least three significant figures.

8. Before transferring the sieved dust sample from the receiving pan to a 30-ml wide mouth polypropylene bottle, perform an acetone rinse on the bottle and wipe clean with Kimwipes. Blow pressurized into the bottle to aid in drying. Once the bottle is dry, the dust can be transferred.

If the dust sample is large and does not seem like it will fit into a single 30-ml polypropylene bottles, multiple polypropylene bottles or a glass ICHEM jar can be used to hold the sample. Whichever method is chosen, be sure to follow the same acetone rinse procedure outlined above prior to placing the sample into the bottles or jar.

9. Transfer the sieved sample from the receiving pan to a 30-ml wide mouth polypropylene bottle. Use a brush to ensure complete transfer of the sample. Cap the bottle to secure the sample. As mentioned above, if the dust sample is very large, multiple bottles or a glass ICHEM jar can be used in place of a single polypropylene bottle.

Appendix B - Rainier Vacuum Dust and Wipe Sampling Risk Based Analytical Concentration Goals (RBACGs) and Analysis of Risks

1. Introduction

Analytical detection limits for PCBs in building dust samples from the Rainier Commons project must be sufficiently low to detect limits of public health concern. However, PCBs are wide spread contaminants. It is hence also important to consider how PCB risk based analytical concentration goals (RBCAGs) compare with levels that are commonly found in building dust.

2. Considerations in Developing PCB Dust RBACGs

2.1. Levels Found in Building Dust

Several studies have evaluated PCB concentrations in building dust. PCB house dust concentrations were measured in homes in close proximity and some distance away from New Bedford Harbor PCB dredging operations. Concentrations ranged from 0.26 to 23.0 mg/kg. In nine Seattle Washington home, house dust PCB concentrations ranged from 0.24 to 0.76 mg/kg. Eight Columbus Ohio homes had PCB concentrations ranging from 0.210 to 1.9 mg/kg (ATSDR 2000). Harrad et al. (2009) measured average house dust concentrations in several locations and obtained the following average concentrations (location/concentration in mg/kg): Austin Texas/0.220, Birmingham UK/0.110, Toronto Canada/0.290, Wellington New Zealand/0.067. Harrad et al. (2009) also noted results for a study of house dust in Singapore that found a value of 0.092 mg/kg, which is lower than concentrations noted in other studies. In the Washington State Department of Health's evaluation of PCB house dust exposure for two homes near the T117 Superfund site in Seattle Washington, PCB concentrations (mg/kg) of 0.756 to 1.57 and 0.891 to 1.03 were obtained (WA DOH 2006). The WA DOH dust samples were sieved to obtain a fraction consisting of 150 microns or less in particle diameter. This was done in order to have a sample that reflected the properties of dust particles that might adhere to skin or that might be incidentally ingested.

2.2. Building Dust Exposure Risks

Cancer risks and non-cancer hazards were evaluated at house dust PCB concentrations of 0.25 and 1.0 mg/kg, as these values were relatively typical of PCB concentrations found in homes. Risks and hazards were evaluated for incidental ingestion of house dust, dermal exposure to house dust, and combined ingestion and dermal exposure. Both adult and child exposures were evaluated. Details of this analysis are presented in the attached appendix.

At all house dust PCB concentrations evaluated, all non-cancer hazards were below EPA's acceptable hazard quotient of 1.

At a house dust PCB concentration of 0.25 mg/kg, child and adult cancer risks were below EPA's deminimis cancer risk of 1 in 1,000,000 for individual and combined ingestion and dermal exposures.

At a house dust concentration of 1.0 mg/kg, adult and child dermal exposure cancer risks were below a risk of 1 in 1,000,000. Ingestion risks and combined dermal and ingestion risks slightly exceeded a risk of 1 in 1,000,000. Combined dermal and ingestion risks were approximately 2 in 1,000,000 for adults and 3 in 1,000,000 for children.

3. Desired Building Vacuum Dust RBACGs

The ability to quantify PCBs in building dust at 0.25 mg/kg, a typical concentration found in house dust, should insure that risks slightly below 1 in 1,000,000 can be quantified. A quantification limit of 0.035 mg/kg would allow detection of risks in the 1 in 10,000,000 range, assuring that risks in the 1 in 1,000,000 range can be accurately determined. However, given the levels of PCBs that have been documented in house dust, it is quite possible that this lower quantification limit may not be needed. A quantitation limit of 0.25 mg/kg is more than adequate to determine if unacceptable non-cancer hazards exist.

4. Desired Building Wipe Sample RBACGs

In addition to vacuum dust samples, PCB levels in dust and on building surfaces will be determined with wipe samples. The PCB regulations in 40 CFR 761 define a clean-up standard or spill cleanup criteria for PCBs of 10 micrograms per one hundred square centimeters (ug/100cm^2) on wipes collected from indoor surfaces. EPA estimated that inhalation cancer risk from exposure to PCBs at 10 ug/100cm^2 would be at 1 excess cancer case per 1,000,000 exposed (1x10-6) [see ref 4 of DOH]. Similarly, EPA estimated that cancer risk from dermal contact with PCBs at 10 ug/100cm^2 would be at 1 excess cancer case per 100,000 exposed [4]. Therefore, wipe samples will be compared to EPA's clean-up standard or spill cleanup criteria for PCBs of 10 ug/100cm^2. Manchester Environmental Laboratory has a Method Detection Limit of 0.5 ug/wipe, which is more than adequate to determine if unacceptable non-cancer hazards exist.

~~Desired reporting limits for PCBs in dust were determined in evaluating health risks in the aftermath of the World Trade Center disaster and were determined to be 16 µg per square meter (World Trade Center Indoor Air Task Force Working Group, 2003). This limit may be translated to a wipe reporting limit using the following calculation.~~

~~16 µg per square meter x 0.01 square meters per wipe = 0.16 micrograms per wipe.~~

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Appendix C: Derivation of Building Dust RBACGs

1. Exposure Parameters Used

Table 1: Exposure Parameter Values					
General				Ingestion	Dermal
BW_c	16	IR_c	200	ABSd	0.14
BW_a	70	IR_a	100	SA_c	2800
CF	1.00E-06	FI	1	SA_a	5700
EF	350			AF_c	0.2
ED_c	6			AF_a	0.07
ED_a	30				
AT_car	25550				
AT_non_c	2190				
AT_non_a	10950				
C	0.25 / 1				

Exposure Parameter Definitions

BW_c: Body weight child, kilograms, EPA 1989
BW_a: Body weight adult, kilograms, EPA 1989
CF: Conversion factor, kilograms per milligram
FI: Fraction ingested from the source, unitless:
EF: Exposure frequency, days per year, BPJ
ED_c: Exposure duration, child, years
ED_a: Exposure duration, adult, years
AT_car: Averaging time carcinogen, days
AT_non_c: Averaging time, non-carcinogen, child, days
AT_non_a: Averaging time, non-carcinogen, adult, days
C: Contaminant concentration, mg/kg
IR_c: Ingestion rate, dust, child, mg/day, EPA 1989
IR_a: Ingestion rate, dust, adult, mg/day, EPA 1989
FI: Fraction of dust ingested from the source, unitless, BPJ
ABSd: Fraction of compound absorbed through skin, unitless, EPA 2004
SA_c: Skin surface area, child, cm^2, EPA 2004
SA_a: Skin surface area, adult, cm^2, EPA 2004
AF_c: Soil to skin adherence factor, mg/cm^2, EPA2004
AF_a: Soil to skin adherence factor, mg/cm^2, EPA 2004

2. Equations Used to Assess Hazard/Risk

INGESTION DOSE

$$Dose_{oral} = (C * IR * CF * FI * EF * ED) / (BW * AT)$$

DERMAL DOSE

$DA_{event} = C_{dust} * CF * AF * ABSd$

$Dose_{dermal} = (DA_{event} * EF * ED * EV * SA) / (BW * AT)$

NON CANCER HAZARD QUOTIENT (HQ)

$HQ_{oral} = Dose_{oral} / RfD$

$HQ_{dermal} = Dose_{dermal} / RfD$

$HQ_{total} = HQ_{oral} + HQ_{dermal}$

RfD: Reference dose, mg/kg/day. Value for Aroclor 1254 = 0.00002.

CANCER RISK

$Risk_{oral} = Dose_{oral} * CPF$

$Risk_{dermal} = Dose_{dermal} * CPF$

$Risk_{total} = Risk_{oral} + Risk_{dermal}$

CPF: Cancer potency factor, $(mg/kg/day)^{-1}$. Value used for house dust exposure is 2.

3. Results

Table 2: Dose, Hazard, and Risk Associated with Exposure to Dust Assuming Dust PCB Concentrations of 0.25 and 1 mg/kg.

INGESTION AND DERMAL			**INGESTION**			**DERMAL**		
NON CANCER			**NON CANCER**			**NON CANCER**		
Dose and HQ	Child	Adult	Dose and HQ	Child	Adult	Dose and HQ	Child	Adult
Dose at 0.25 mg/kg	4.2E-06	5.3E-07	Dose at 0.25 mg/kg	3.0E-06	3.4E-07	Dose at 0.25 mg/kg	1.2E-06	1.9E-07
Dose at 1 mg/kg	1.7E-05	2.1E-06	Dose at 1 mg/kg	1.2E-05	1.4E-06	Dose at 1 mg/kg	4.7E-06	7.7E-07
HQ at 0.25 mg/kg	2.1E-01	2.7E-02	HQ at 0.25 mg/kg	1.5E-01	1.7E-02	HQ at 0.25 mg/kg	5.9E-02	9.6E-03
HQ at 1 mg/kg	8.3E-01	1.1E-01	HQ at 1 mg/kg	6.0E-01	6.8E-02	HQ at 1 mg/kg	2.3E-01	3.8E-02
CANCER			**CANCER**			**CANCER**		
Dose and Risk	Child	Adult	Dose and Risk	Child	Adult	Dose and Risk	Child	Adult
Dose at 0.25 mg/kg	3.6E-07	2.3E-07	Dose at 0.25 mg/kg	2.6E-07	1.5E-07	Dose at 0.25 mg/kg	1.0E-07	8.2E-08
Dose at 1 mg/kg	1.4E-06	9.2E-07	Dose at 1 mg/kg	1.0E-06	5.9E-07	Dose at 1 mg/kg	4.0E-07	3.3E-07
Risk at 0.25 mg/kg	7.2E-07	4.6E-07	Risk at 0.25 mg/kg	5.1E-07	2.9E-07	Risk at 0.25 mg/kg	2.0E-07	1.6E-07
Risk at 1 mg/kg	2.9E-06	1.8E-06	Risk at 1 mg/kg	2.1E-06	1.2E-06	Risk at 1 mg/kg	4.0E-07	6.6E-07